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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/744,926	01/30/2001	Claus Frohberg	514413-3865	6519

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EXAMINER
KALLIS, RUSSELL

ART UNIT	PAPER NUMBER
1638	10

DATE MAILED: 10/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/744,926	Applicant(s) FROHBERG, CLAUS	
	Examiner Russell Kallis	Art Unit 1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 August 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *26-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *26,28-33 and 37-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *8* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I, claims 26, 28, 30-33, and 36-39 in Paper No. 9 is acknowledged. The traversal is on the ground(s) that all of the claims relate to nucleic acids that can be used to synthesize modified starch in plants. This is not found persuasive because the individual Groups I-XI comprise a variety of unique combinations of nucleotide sequences with different biochemical mechanisms and hence are drawn to eleven different products and methods of their use. Furthermore, the claims do not constitute an advance over the prior art, as stated below, and so are not linked by a special technical feature.

Applicant's request for the addition of amended Claim 29 and newly added Claims 40 and 41 to Group I is granted by Examiner.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 26, 28-33, and 37-41 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant broadly claims a nucleic acid molecule encoding a protein from any source and of any sequence with the function of a potato α-glucosidase, a nucleic acid molecule encoding a protein that encompass SEQ ID NO: 2 or its derivatives or parts of any sequence or length, nucleic acid molecules that encompass SEQ ID NO: 1 or its derivatives or parts and nucleic acid molecules that specifically hybridize with, are complementary to, deviate from, and have more than 70% homology than said nucleic acid molecules.

Applicant describes the native nucleic acid molecule of SEQ ID NO: 1 encoding an entire α-glucosidase from potato of SEQ ID NO: 2.

Applicant does not describe nucleic acid molecules that encompass SEQ ID NO: 1 or its derivatives or parts and nucleic acid molecules that specifically hybridize with, are complementary to, degenerate deviations from, and have more than 70% homology than said nucleic acid molecules, and a nucleic acid molecule encoding a protein that encompasses SEQ ID NO: 2 or its degenerate derivatives or parts other than SEQ ID NO: 1.

Given the claim breadth and lack of guidance as discussed above, the specification does not provide an adequate written description of the claimed invention.

See *University of California V. Eli Lilly and Co.*, 43 USPQ2d 1398 (Fed. Cir. 1997), which teaches that the disclosure of a process for obtaining cDNA from a particular organism and the description of the encoded protein fail to provide an adequate written description of the actual cDNA from that organism which would encode the protein from that organism, despite the disclosure of a cDNA encoding that protein from another organism.

The court also addressed the manner by which genus of cDNAs might be described: "A description of a genus of cDNAs may be achieved by means of a recitation of a representative

number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or of a recitation of structural features common to the members of the genus, which features constitute a substantial portion of the genus." *Id.* At 1406.

4. Claims 26, 28-33 and 37-41 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a nucleic acid molecule of SEQ ID NO: 1 encoding a protein with the function of a potato α-glucosidase of SEQ ID NO:2, does not reasonably provide enablement for nucleic acid molecules that encompass SEQ ID NO: 1 or its derivatives or parts and nucleic acid molecules that specifically hybridize with, complementary to, deviate from, and have more than 70% homology than said nucleic acid molecules, antisense of said molecule, a vector comprising said nucleic acid molecule, host cell comprising said vector, a method for making a transgenic plant with modified starch using said vector comprising said nucleic acid molecule integrated into the plant genome, and transgenic plant cells and plants thereof. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

Applicant broadly claims a nucleic acid molecule encoding a protein of any sequence and from any source with the function of a potato α-glucosidase, a nucleic acid molecule encoding a protein that encompass SEQ ID NO: 2 or its derivatives or parts of any sequence or length, nucleic acid molecules that encompass SEQ ID NO: 1 or its derivatives or parts and nucleic acid molecules that specifically hybridize with, complementary to, deviate from, and have more than 70% homology than said nucleic acid molecules, antisense of said molecule, a vector comprising said nucleic acid molecule, host cell comprising said vector, a method for making a transgenic

plant with modified starch using said vector comprising said nucleic acid molecule integrated into the plant genome, and transgenic plant cells and plants thereof.

Applicant teaches isolation of a cDNA fragment encoding a potato α-glucosidase (Example 1 page 47-48), preparation of plasmid p35SαSSI-Hyg (Example 2 page 48), preparation of plasmid p35S-SSI-Kan (Example 3 page 48), preparation of plasmid p35SαSSII-Kan (Example 4 page 48), preparation of plasmid pB33-SSII-Hyg (Example 5 page 48-49), preparation of plasmid p35Sα-Hyg (Example 6 page 49), preparation of plasmid p35S-SSIII-Kan (Example 7 page 49), preparation of plasmid pB33αBEαSSIII-Kan (Example 8 page 49), preparation of plasmid pB33αSSII-αSSIII-Kan (Example 9 page 49-50), preparation of plasmid pB33αSSIαSSIαSSIII-Kan (Example 10 page 50), preparation of plasmid p35SαSSII-Hyg (Example 11 page 50), potato transformation (Example 12 page 50), and characterization of modified starch (Example 13 page 50-51).

Applicant does not teach a method of modifying starch in transgenic plant cells and transformed plants using derivatives or parts of nucleic acid molecules that specifically hybridize with, are complementary to, deviate from, and have more than 70% homology than said nucleic acid molecule of SEQ ID NO: 1, encoding protein parts and derivatives thereof with the function of a potato α-glucosidase other than SEQ ID NO: 2.

The unpredictability of predicting enzyme activity based upon sequence identities that are derivatives of or parts of nucleic acid molecules that specifically hybridize with, are complementary to, deviate from, having more than 70% homology can be extrapolated from the examples where either a single amino acid change or a small number of changes have been introduced into proteins resulted in either a complete loss of activity or a change in the substrate.

The inherent unpredictability in isolation of a specific activity is illustrated in an example where a small number of changes to the coding region for a strict desaturase resulted in an enzyme with a hydroxylase activity and that a small number of changes to the coding region of a desaturase could account for the functional divergence seen across a range of enzymes involved in fatty acid metabolism (Broun *et al.* Science Vol. 282 13 November 1998; Abstract lines 4-6 and p. 1317 column 1, lines 51-56). In addition, a single amino acid change in a conserved binding domain of spinach rubisco activase resulted in an enzyme with no activity. (Shen *et al.* J. of Biol. Chem. May 15, 1991, Vol. 266, No. 14, pp. 8963-8968, page 8963 column 2, lines 3-8). Hence, one cannot readily predict enzyme activity based upon changes in amino acid composition. In the case of determining which amino acid residues, or combination of residues, when changed would be permissive of an embodiment of the invention, a person of average skill in the art would have to either test them experimentally for activity *in vitro* and *in planta*, or resort to *de novo* methods to find a sequence that would allow for a protein having the function of a potato α-glucosidase enzyme. Therefore, undue trial and error experimentation would be required to screen through the multitude of non-exemplified nucleic acids encoding proteins with any of the myriad of different amino acid substitutions, parts of, and derivations of to identity those that have the function of a potato α-glucosidase enzyme, and hence could be used in the claimed invention.

Given the lack of guidance, the lack of examples in the specification, the breadth of the claims, and the unpredictability in the art, undue trail and error experimentation would have been required by one skilled in the art to identify and isolate non-exemplified fragments and parts of nucleic acid molecules encoding SEQ ID NO: 2 or parts thereof with at least 70% sequence

identity to SEQ ID NO: 1 encoding an α-glucosidase enzyme, and to evaluate the ability of these nucleic acid molecules to alter starch composition in plant cells and plants comprising said non-exemplified nucleic acid molecules and enzymes.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 26, 28-33, and 37-41 are rejected under 35 U.S.C. 102(b) as being anticipated by Nickerson *et al.* WO 97/24448.

The claims are broad for the reason discussed supra. In particular, DNA derivatives or parts there of SEQ ID NO: 1 of any length or sequence encoding a protein having the function of a potato α-glucosidase read on essentially any DNA sequence encoding a functional α-glucosidase from any source, natural or synthesized, and the RNA molecule that is taught inherently.

Nickerson teaches isolation of a potato cDNA activity using an *Arabidopsis* EST having sequence similarity to human α-glucosidase lysosomal gene as a probe (Example 1 page 11, lines 15-25), complementation of a yeast α-glucosidase mutant (Example 2 page 15, lines 4-17), sense and antisense transformation and regeneration of potato with potato α-glucosidase cDNA (Example 3 page 16, lines 19-33), reduction of α-glucosidase activity in transformed potato (Example 4 page 17, lines 1-13), lower starch day/night turnover in α-glucosidase antisense

potato transgenic plants relative to the higher turnover of starch in transgenic control plants transformed with vector DNA constructs (Example 6 page 18, lines 20-30), modified starch on page 8 lines 22-31. Thus, the reference discloses all the limitations of the instant claims.

7. All claims are rejected.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell Kallis whose telephone number is (703) 305-5417. The examiner can normally be reached on Monday-Friday 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amy Nelson can be reached on (703) 306-3218. The fax phone numbers for the Group is (703) 308-4242 or (703) 305-3014.

Any inquiry of a general nature or relating to the status of this application or proceeding, or if the examiner cannot be reached as indicated above, should be directed to the legal analyst, Sonya Williams, whose telephone number is (703) 308-0009.

Russell Kallis Ph.D.
September 29, 2002

DAVID T. FOX
PRIMARY EXAMINER
GROUP ~~180~~ 1638